EXHIBIT B

Brooks, Jeff

Volume 1 - 01/23/2020

Summary Proceeding with Highlighted Clips

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CONFIDENTIAL

P counter-counters (Runtime - 00h:08m:25s)

Plaintiffs Designation (Runtime - 00h:18m:31s)

Plaintiffs Objections (Runtime - 00h:10m:49s)

Defense Counters (Runtime - 00h:51m:52s)

Defense Objections (Runtime - 00h:01m:33s)

Page 00007

01: THE VIDEOGRAPHER: This begins the video
02: deposition of Jeff Brooks as PMK for Chart, Inc.,
03: being taken in the matter of Pacific -- In Re:
04: Pacific Fertility Center Litigation. Today's date
Plaintiffs Objections Objection starts with "The time":
05: is January 23rd, 2020. The time on the record is
06: 9:19 a.m. My name is Brandyon Brantley. I'm the
07: videographer. The court reporter is Laura MacKay.

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10: Could you please state your full name for
11: the record.
12: A. Jeffrey Steven Brooks.

Page 00009

13: Mr. Brooks, do you understand that today
14: Chart, Inc., has designated you to testify on its
15: behalf?
16: A. Yes.
17: Q. Okay. And are you willing to testify on
18: Chart's behalf today?
19: A. Yes.
20: Q. And in addition, we've also noticed your
21: deposition in your individual capacity. For
22: purposes of today the majority of our questions I
23: think will be to you as Chart's witness, and you
24: should assume the questions are directed at Chart,
25: unless indicated otherwise, as a means of

(continued page 00010)

0010

01: differentiating between Chart and your individual
02: testimony.

Plaintiffs Objections 402/403 - relevance, waste of time:

MR. SMITH: I'll just object to that to the extent it's not clear. I'll make an objection at the time.

BY MS. ZEMAN:

Q. Mr. Brooks, what did you do to prepare for your deposition today?

A. I looked at several binders full of emails and other documents.

Page 00013

Q. Mr. Brooks, do you have a college degree?

A. I do.

Q. And what is that degree?

A. It's a bachelor of science in mechanical engineering technology.

Page 00013

Q. And who is your current employer?

A. Chart, Incorporated.

Q. And what's your position with Chart, Incorporated?

A. I am currently titled innovation engineer.

Q. And what is an innovation engineer?

A. We do new product development.

Q. And how long have you been an innovation engineer?

A. About six years.

Q. Were you with Chart before then?

A. Yes.

Q. What was your position with Chart before the innovation engineer?

A. Sustaining engineer.

(continued page 00014)

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Q. And what does a sustaining engineer do?
A. Sustaining engineer does continuous improvement on the product and maintaining documentation like bills of material and drawings and such.
Q. Did you work with the MVE 808 in that position?
A. Yes.
Q. In what ways?
A. As the sustaining engineer in product engineering.
Q. What did you do specifically regarding the MVE 808 as a sustaining engineer?
MR. SMITH: Overbroad.
BY MS. ZEMAN:
Q. You can answer.
A. It was mainly sustaining activity: maintaining bills of material and drawings.
Q. Did you make any changes to the drawings?
A. There were changes to drawings, yes.
Q. What sort of changes did you make to the drawings of the MVE 808?
A. Miscellaneous, you know, sometimes to clarify material requirements or assembly requirements.

(continued page 00015)

0015

Q. So assembly requirements. What did you say for that?

A. Material requirements.
Q. What sort of material requirements changed?
A. Sometimes it would be material length. Sometimes width. I mean, just minor size changes, typically. It's mature product, and very little maintenance was actually done to it.
Q. What do you mean by a "mature product"?
A. It was developed in the '80s or the '70s, probably, and no substantial changes have been done to it since that time.
Q. Can you give me some examples of the changes that have been made to it?
A. The only significant change would be the addition of annular lines for -- to allow the use of differential pressure censor for the controller.
Q. When were those added?
A. That would have been in the mid-'90s.
Q. And the tank has two annular lines, correct?
A. Correct.
Q. Were both of the lines added in the mid-'90s?
A. Yes.

(continued page 00016)

Q. And you referred to continuous improvements. What does that mean?
A. That generally means minor changes that would allow production to produce the -- the product easier, quicker, or to improve the user interface.
Q. Would the addition of the annular lines be

considered a continuous improvement?

A. Yes.

Q. And were there any other significant changes to the MVE 808?

A. None that I recall.

Q. Have the materials used to construct the MVE 808 changed?

A. No.

Q. Not since it was initially designed in the '70s or '80s?

A. Not since I've became involved with the product in the early '90s. I can't speak to what might have happened before I became involved with the product.

Plaintiffs Objections 402/403 - relevance, waste of time:

Q. Okay. And during what time period were you assisting engineer?

A. Could you restate that, please.

Q. During what time period did you serve as a sustaining engineer at Chart?

(continued page 00017)

A. I don't remember years very well anymore. They all kind of run together. But I was sustaining engineer for about five or six years before I became an innovation engineer, and that was -- so it was probably 10 or 15 years ago. Probably closer to 15, when I became -- a sustaining engineer became my title.

Q. Okay. And were you with Chart before you were a sustaining engineer?

A. I was.

Q. Okay. And what was your position?
A. Product engineer.
Q. And how long were you a product engineer?
A. Probably ten years.
Q. And what did you do as a product engineer?
A. The same thing as I did as a sustaining engineer. That was -- that title change was not a job change. It was just a title change.
Q. Okay. Is that true for your entire period as a product engineer, that the work is comparable to what you did as a sustaining engineer?
A. Yes.
Q. And were you with Chart before you were a product engineer?
A. Yes.

(continued page 00018)

0018

Q. What were you before a product engineer?
A. I was a lab technician.
Q. How long were you a lab technician?
A. Probably five years. Well, make that three.
Q. And what did you do as a lab technician?
A. Testing of materials and finished product and components that go into the product.

Page 00018

Plaintiffs Objections 402 relevance; 403 waste of time :

Q. Okay. And were you with Chart before you were a lab technician?
A. No.
Q. When did you start with Chart?

(continued page 00019)

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Q. I started at this location before it became Chart in 1989.
Q. Were you with MVE?
A. I was with CSI Cryogenic Services.
Q. How did CSI come to be a Chart location?
A. MVE purchased CSI two years after I went to work there, about two years after I went to work there, and then Chart purchased MVE in the mid to late '90s.
Q. So you started with CSI in 1989?
A. Correct.
Q. And, then, CSI was purchased by MVE in maybe 1991 or so?
A. Yes.
Q. Okay. And then mid to late '90s, CSI was purchased by Chart?
A. Yes.
Q. MVE was purchased by Chart.
A. Yes.
Q. Okay. And what was your position with CSI when you started in 1989?
A. Lab technician.
Q. Is that the lab technician position that you described earlier?
A. Yes.

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Plaintiffs Objections 402/403 - relevance, waste of time, cumulative:

Q. The MVE 808 is a vacuum-insulated freezer, correct?

A. Correct.
Q. Can you describe what that means?
A. That means that it has an inner and outer wall that is sealed and evacuated to provided insulation, thermal insulation.
Q. Does that mean the vacuum space provides the insulation?
A. The vacuum space provides the bulk of the insulation, yes.
Q. What else provides the insulation?
A. There's a multi-layer insulation system wrapped around the inner container before it is

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placed in the outer container.
Q. Does that insulation reside inside the vacuum space?
A. It does.
Q. So the vacuum plus the insulation accounts for the insulation of the -- of the maintenance of the cold temperatures in the freezer?
A. Yes.
Q. And do the annular lines go through the vacuum space?
A. They do.
Q. Is there anything other than insulation in the vacuum space -- let me rephrase that.
Is there anything other than insulation and the annular lines inside the vacuum space?
A. Yes.
Q. What else?

A. There is a gettering system that absorbs gas molecules that enter into the vacuum space after it is sealed off.

Q. Is there anything else in the vacuum space?

A. No.

Q. And did you say that the gettering system would collect molecules that enter the vacuum space after it's been sealed?

(continued page 00022)

0022

A. Yes.

Q. How would anything enter the vacuum space after it's been sealed?

A. There are multiple ways. The stainless steel material used for the inner and outer wall out gases molecules throughout the life of the container, and small gas molecules can migrate through the walls over time.

Q. Any other methods for molecules to get into the vacuum space?

A. Molecules mainly make their way through small molecular-size openings throughout the assembly over time.

Q. Even with the vacuum in place?

A. Yes.

Q. What types of molecules does the stainless steel outgas?

A. Mostly hydrogen.

Q. And what type of molecules would migrate through the stainless steel over time?

A. Any molecule of gas that is in the

atmosphere can migrate through the structure.

Q. And as for the stainless steel off-gassing throughout its life, you said mostly hydrogen.

Is there something other than hydrogen that

(continued page 00023)

0023

it would off gas?

A. None that I'm aware of. As far as I know, hydrogen is the -- is the molecule that outgasses from the material.

Q. And it would off-gas the hydrogen in a gas format?

A. Yes. I mean, it releases molecules, and the pressures are low enough that it's in the gaseous state. The temperature is warm enough that it's in a gaseous state.

Q. What other state could hydrogen be in?

A. Hydrogen can be in a liquid state. If you get cold enough, it could be in a solid state, but that generally does not happen here. Some other planet in the system where it's colder than you can get it here might freeze it.

Q. So for hydrogen to be in a solid state, it would have to be at a level of cold that is not reasonably possible?

A. Correct.

Q. How does the volume of the molecule of hydrogen in a gaseous compare to its volume in a liquid state?

A. I do not know that off the top of my head.

Q. Do you have any opinion on the comparison?

(continued page 00024)

0024

A. Well, at the molecular level, there's no -- there's no difference. The molecule size is consistent whether it be in a gaseous or a liquid state. When the molecules come together in insufficient quantity at the right pressure it's a liquid. Otherwise it's a gas.

Q. And the annular lines pass through the vacuum space and then open into the inner vessel, correct?

A. Correct.

Q. And where is that opening?

A. It is near the bottom of the shell of the inner container, just above the inner bottom head of the container. Probably an inch or so above the head. Probably two inches above the ultimate bottom of the container.

Q. And why are they in that location?

A. To measure the weight of the liquid column that is in the freezer to determine what the liquid level in the freezer is. You want the entry port to be as close to the bottom of the container as possible.

Q. When it reads the level, is it reading just from the level of that port opening?

A. It does read from the weight of the liquid

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0025

column that's above the port.

Page 00025

Q. When the annular lines were added to the design, was there any testing done of the tank at that time?

MR. SMITH: Vague.

A. There was no testing done.

BY MS. ZEMAN:

Q. Was there any quality assessment done?

A. No.

Q. Was there any risk analysis done?

A. No.

Q. Does the MVE 808 have a false bottom?

A. Yes.

Q. And what does that mean?

A. It's just an aluminum disk that is placed in the bottom to provide a level surface for the inventory system to be placed on. The bottom head is not flat, so a level surface is required for the inventory system, so a false bottom is installed to

(continued page 00026)

provide that.

Q. How much space is below the false bottom?

A. Perhaps an inch, but I do not know for certain.

Q. And would it be a uniform inch?

A. No.

Q. Why not?

A. The inner bottom head being -- having flat surfaces, when a vacuum is pulled on the back side of it, it deforms and becomes not flat. So at the outer edges where it connects to the inner shell,

the distance between the false bottom and the head would be smaller than it would be as you approach the center.

Q. So when you say about an inch below, would that be your estimate for the deepest gap, the biggest gap between the false bottom and the head?

A. Yes.

Q. Do you know what the volume of space is below the false bottom?

A. I do not.

Q. What is the proper process to fill an MVE 808 with liquid nitrogen?

MR. SMITH: Vague. Outside the scope.

BY MS. ZEMAN:

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Q. Go ahead.

A. So there's two different processes. One applies to a freezer with the autofill assembly installed, and another applies to the freezer that does not have an autofill system installed.

Which system do you want?

BY MS. ZEMAN:

Q. Let's start with the autofill.

A. With an autofill system, you would connect a transfer hose from a liquid supply to the inlet connection to the plumbing assembly, and then open the supply valve at the liquid source, plug the power supply in; and the controller, after it boots up, will open the fill valves and allow liquid nitrogen to pass into the freezer. It will then

monitor the level during that fill proceeds, and close the valves and stop the flow of liquid nitrogen into the freezer when the level reaches to a programmed high fill setting.

Q. And if the tank were being put into service for the first time, would it start that process at room temperature?

A. Yes.

Q. Does Chart provide instructions for end users to initiate a fill?

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A. Yes.

Q. And to initiate a fill for an empty tank?

A. Just as I've just described.

Q. Where are those instructions?

A. There is a quick start guide that is provided the freezer, and there is a technical manual that is available for the freezer.

Q. Is the quick start guide physically provided with the freezer?

A. Yes.

Q. And what would be the procedure without an autofill?

A. You would connect the liquid transfer hose to the liquid supply, stall a face separator at the other end of the transfer hose, place that face separator inside the freezer, and open the valve to supply liquid from the supply.

Q. And that procedure, again, would be starting at room temperature?

A. If -- if the freezer is -- if it's the first fill, yes, it would be starting from room temperature.

Q. You mentioned that the vacuum space on the MVE 808 contains insulation.

A. Yes.

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Q. What is that insulation?

A. It's a multi-layer insulation. There is a layer of foil and a layer of what's called paper, which is a fiberglass-based paper that are interleaved, and there's 30 layers of this alternating material.

Q. The first layer that you referred to, did you say full?

A. Foil, aluminum foil.

Q. So the first layer is aluminum foil?

A. One of the layers is aluminum foil, yes.

Q. And then the aluminum foil alternates with the fiberglass-based paper?

A. Yes.

Q. And is it 30 layers total?

A. Yes. Well, there would be 30 layers of each material.

Q. So a total of 60 layers.

A. Correct.

Q. What's the outer layer?

A. Well, it does not matter which layer is the outer as long as the inner layer and the outer layer are not the same material.

Q. How much insulation is inside a single MVE 808?

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0030

A. I -- other than, you know, 30 total layers of each material, I couldn't say how much it is. That information is available in our system, but I don't know it off the top of my head.

Q. Where in your system is that information?

A. It's on the bill of material.

Q. What's the bill of material?

A. Bill of material, that -- that's the -- essentially a list of the material that the part numbers and quantities of materials that are used to build the freezer.

Q. Would the bill of material for the MVE 808 essentially list the materials and quantities needed to build a single MVE 808 freezer?

A. Yes.

Q. And that document would be titled just bill of material?

A. Yes.

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Plaintiffs Objections 402 relevance; 403 waste of time :

Q. Is the insulation absorbant?

A. No.

Q. Has the insulation material changed on the MVE 808?

A. No.

Q. It's been the same since it was originally designed?

15: A. It has been the same since I became
16: involved with the product.
17: Q. And when was that again?
18: A. The mid-'90s.

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16: Q. And does the MVE 808 contain a molecular
17: sieve material?
18: A. It did contain a molecular sieve.
19: Q. And what is that material?
20: A. The name of it is Cryo-Sieve. What the
21: actual material is, I don't know.

Plaintiffs Objections 403 waste of time :

22: Q. Is Cryo-Sieve a brand?
23: A. It is a brand.
24: Q. And who produces?
25: A. Arkema, A-r-k-e-m-a.

(continued page 00033)

0033

01: Q. And has Cryo-Sieve been the molecular
02: material for the MVE 808 since the '90s?
03: A. Yes.
04: Q. And are there any other terms used within
05: Chart for the sieve material?
06: A. No.
07: Q. Is it sometimes referred to as getter?
08: A. Yes.
09: Q. Any other terms like that?
10: A. No.
11: Q. So sieve or getter would be the only terms
12: used to refer to it other than, perhaps, Cryo-Sieve?
13: A. Yes.

Q. Can you describe that material?
A. It is a small pellet, about a 16th-inch diameter, that is very porous.
Q. Did you say you don't know the exact material?
A. Correct, I do not.
Q. What do you mean by "very porous"?
A. It's an actual -- the actual surface area that's exposed to the vacuum space is several hundred times larger than what you would expect of a 1/16th-inch pellet. It probably has at least as much void area in it as it has actual sieve

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0034

material.
Q. What is the purpose of that void area?
A. To allow gas molecules to enter into the pellet.

Plaintiffs Objections 602 speculation; incomplete hypothetical:

Q. What happens once the gas molecules get into the pellet?
MR. SMITH: Incomplete hypothetical.
A. It captures the molecule. The molecule is captured by the pellet and kept there.
BY MS. ZEMAN:
Q. That means the molecule is unable to escape the pellet?
MR. SMITH: Same objection.
A. The pellet absorbs -- it captures molecules more efficiently as it gets colder. When the pellet warms up, it will release that molecule.
BY MS. ZEMAN:

Q. How much does it have to warm up to release the molecule?

MR. SMITH: Incomplete hypothetical.

A. There's a linear relationship there. As it warms up, it releases more and more material as it gets warmer and warmer.

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Q. Okay. And the first item under -- on the parts list is described as "SIEVE MOLECULAR CRYOSIEVE 1/16th PALLADIUM OXIDE 76-80%-40 Mesh"; is that correct?

A. No. The first item is "SIEVE MOLECULE CRYOSIEVE 1/16th". The second item is "PALLADIUM OXIDE 76-80%-40 MESH." Those are two part numbers.

Q. Okay. And what's the difference between those two parts?

A. The -- they are both part of the gettering system. The molecular sieve is what we've discussed already. The palladium oxide reacts with hydrogen and converts it to water, and the water vapor is then absorbed by the molecular sieve.

Q. What are all of the elements of the gettering system?

(continued page 00038)

0038

A. Those two are it.

Q. When you refer to the palladium oxide reacting with hydrogen and converting it to water, is it converting it to liquid water or gaseous water?

A. It would be gaseous water.

Q. And where is that hydrogen coming from that it's converting?

A. Hydrogen is out-gassed from the stainless steel material of the container, and it can also migrate through the material over time.

Q. Does the palladium oxide convert anything other than hydrogen?

A. Not to my knowledge.

Q. And does the molecular sieve absorb anything other than gas molecules?

A. No.

Q. And what gases other than hydrogen are you familiar with being inside the vacuum space of a freezer?

A. Any gas molecule that's found in the atmosphere.

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Q. Where are the molecular sieve and the palladium oxide located inside the MVE 808?

A. The molecular sieve is -- is contained in a depression that is formed in the inner bottom head. The palladium oxide is in a packet form that is just placed inside the vacuum space.

Q. Where inside the vacuum space?

A. Typically they would place it on the insulation that covers the inner bottom head before the outer vessel is installed.

Q. How big is the packet?

A. Couple inches long, maybe a quarter inch in diameter.

Q. And is it just a single packet of palladium

oxide in each MVE 808?

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0040

A. I believe so, yes.

Page 00040

Q. Is the sieve material placed in some sort of pan?

A. In the case of the 808, there is a depression formed in the inner bottom head so that the pan is not required. It is captured in that depression by a sheet of stainless that is placed over it and tack welded to the inner bottom head.

Page 00042

Q. Why does the MVE 808 contain molecular sieve and palladium oxide?

MR. SMITH: Asked and answered.

A. It -- it is there to capture molecules of gas that enter the vacuum space after it is evacuated and sealed off.

BY MS. ZEMAN:

Q. Why is it necessary to do that?

A. Because gas is -- gaseous molecules are entering the vacuum space continuously from the time it is sealed off.

Q. Why do they need to be captured? Why can't they just stay in the vacuum space?

A. The major part of the insulation that allows it to contain in cryogenic liquid without

(continued page 00043)

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substantial evaporation of the cryogenic liquid and

condensation or ice on the exterior, that requires a vacuum, and if enough molecules enter the vacuum space, there's no longer a vacuum and that vacuum insulation no longer exists.

Q. Why would the presence of gas molecules cause there to not be a vacuum?

A. The definition of a vacuum is the absence of stuff. So those molecules, when they enter -- you know, if they fill up the vacuum space, it's no longer a vacuum.

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Defense Objections Inadmissible other occurrence evidence not previously ruled on; not substantially similar; FRE 403/802/803:

Q. And how did you determine that the sieve material had released molecules?

A. Because the pressure in the vacuum space increased above ambient.

Q. Could anything else have caused the increase in pressure other than a release of molecules from the sieve?

A. If liquid nitrogen had entered the vacuum space, it could cause the pressure to increase above ambient.

Q. How would that occur?

MR. SMITH: Incomplete hypothetical.

A. In its liquid form, it is much more dense

(continued page 00050)

0050

than in its gaseous perform. So when it enters the vacuum space, it is no longer insulated from ambient temperatures. It will evaporate at a higher rate and its volume dramatically increases, thus dramatically increasing its pressure, thus it

could -- that pressure could increase to a pressure above ambient pressure.

Page 00056

Q. How is the vacuum space sealed on an MVE 808?

A. Well, the --

(continued page 00057)

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MR. SMITH: Let me just object. Vague and overbroad. Go ahead.

A. The -- the weld seams where the heads and shelves and neck are welded together are a sealing point, as is the evacuation port where the vacuum space is evacuated to create the vacuum is sealed with a plug with O-rings.

Q. Other than at the evacuation port, is the vacuum space sealed by a weld?

A. Other than at the evacuation port, yes, all of the other welds make all the other seals in the system.

Q. And what material is used to form a weld?

A. Typically it's a 308 stainless steel material. That is what is commonly used when welding 304 stainless.

Q. Is it machine-welded or hand-welded?

A. The 808 specifically?

Q. Correct.

A. To my knowledge, it's all hand-welded.

Page 00061

Q. Are there quality assurance measures in place to ensure the welds are done properly?

15: A. Yes.
16: Q. What are those measures?
17: A. There is a visual inspection for the
18: cosmetic appearance, and the heated mass
19: spectrometer test is done to identify any ingress
20: points that would need to be corrected before it is
21: evacuated.
22: Q. Are the quality assurance measures applied
23: for every single tank?
24: A. Yes.
25: Q. So I think you had identified a visual

(continued page 00062)

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01: inspection and the mass spec test. Are there any
02: others?
03: A. For welding?
04: Q. Correct.
05: A. Those are the tests that -- you know, the
06: inspections that are done prior to evacuation.
07: After evacuation, there is a warm vacuum check that
08: is done to measure the vacuum, which is another
09: indicator that any ingress points larger than what
10: mass spec is looking for do not exist after it has
11: been evacuated and sealed off.
12: Q. What is a warm vacuum check?
13: A. It's simply measuring the vacuum pressure
14: in the vacuum space of the individual unit after it
15: has been evacuated on -- by the main vacuum
16: manifold.
17: Q. It's checking the pressure within the
18: vacuum space?

19: A. Yes.
20: Q. How does it do that?
21: A. There is a fixture that attaches to the
22: evacuation port of the individual unit, and it has
23: an operator that can remove the plug that seals the
24: vacuum port. And on the other end of it, it has an
25: evacuation port identical to the one that's on the

(continued page 00063)

01: unit that will allow that -- the volume of that
02: fixture to be evacuated.
03: There is a gauge port for measuring the
04: vacuum pressure inside that volume attached to it,
05: and they attach it to the unit, evacuate that
06: volume, seal off the port at -- the evacuation port
07: of the fixture at that end, and then open the plug
08: to the vacuum space of the unit so that the volume
09: of the fixture is at the same pressure as the volume
10: of the vacuum space for the unit, and read that
11: pressure. Once that pressure is read, they seal off
12: the vacuum space for the unit and remove that
13: fixture.
14: Q. So prior to evacuation, the quality
15: assurance measures for the welds would be a visual
16: inspection and the mass spec test, and then after
17: the vacuum is evacuated, it would be the warm vacuum
18: check?
19: A. Yes.

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22: Q. Okay. And what quality assurance is there
23: completed for the tank overall?

A. There is, again, a visual inspection for cleanliness and to make sure that all required

(continued page 00064)

components are installed, and then there's a complete function test on all units that have an autofill system installed.

Q. So a visual inspection and then a complete function test for the units with autofill?

A. Yes.

Q. Anything else?

A. There is a normal evaporation test that is done on a -- on a -- on a sample basis. It is not -- not all units get that test. It's a sample inspection.

Q. How many units get the NER test?

A. One per model per month.

Q. And how is that tank selected?

A. Typically it would be the first -- a unit from the first work order of a particular model built each month chosen at random from that -- from that batch.

Q. So for the tank, overall, the quality assurance measures are visual inspection, the complete function test for those units with autofill, and the NER test on a sample basis?

A. Yes.

Q. And how is the NER test done?

A. They would fill it with liquid nitrogen to a level prescribed by the work instruction. I

don't -- I couldn't quote that value off the top of my head. I know the general process. And then it would be set aside and allowed to cool down the mass of the inner container to reach a state of thermal equilibrium.

It would then -- they would then take a weight with a scale recording the date and time and the weight, and then they would set it aside again for a prescribed amount of time prescribed by the work instruction, at which point a second weight would be taken and recording the weight, date and time. And those values would be used to calculate an evaporation rate in liters per day. That number would be compared to the allowable value that's in the work instruction as a pass/fail criteria.

Page 00065

Q. For the three quality assurance measures you identified for the welds, are those done for every single tank?

A. Yes.

Q. And is the material used for the welds on

(continued page 00066)

0066

the MVE 808 supplied from the same supplier for all MVE 808s?

A. Yes.

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Q. Are you aware of weld failures occurring on Chart tanks?

MR. SMITH: Vague.

A. What do you mean by "weld failure"?

BY MS. ZEMAN:

Q. The weld failing to seal.

A. I am aware that on occasion welds do fail to seal, but those failures to seal would be normally detected by the mass spec process and would be corrected before evacuation. Any that weren't found in the mass spec process should be indicated by an elevated pressure at the warm vacuum test, which would cause it to be rerouted back into production to -- to locate any ingress points that are -- you know, that have gone above what the mass spec test is looking for and, again, correct it, and it would go back through evacuation.

Q. Are you aware of any weld failures being

(continued page 00068)

0068

detected in the field?

A. I can't say that I do, no.

Q. Are you aware of any instance where a crack has been detected in a weld on a Chart stainless steel freezer?

A. I can't say that I recall hearing of that.

Page 00070

Does Chart recommend that its stainless steel freezers be fully thawed at any point?

A. Yes.

Q. Where does Chart recommend that?

A. It is -- I believe it is in the technical manual. I do not know if it is in any other document, but I believe it is in the technical manual.

Q. And what are the circumstances under which Chart recommends a tank be thawed?

MR. SMITH: Vague. Best evidence.

A. It is recommended that it be taken out of service and warmed up to get all of the moisture out of it at some interval. I do not recall what that interval is at this point. But ice does accumulate inside of a freezer over time, and it should be

(continued page 00071)

0071

taken out of service at some interval to remove that moisture from the container.

BY MS. ZEMAN:

Q. And is the expectation that the freezer would be put back in service after doing this thaw?

A. Yes.

Page 00075

Q. How is the vacuum drawn on an MVE 808?

A. There is a manifold, which is a long pipe, that is evacuated by a vacuum pump, and that pipe has ports along its length with valves to seal those ports off. A hose is connected between the -- those -- a valve at the port to the evacuation port on the individual unit, and the valve at the port on the manifold is opened to allow gas to be drawn from the vacuum space of the individual unit to evacuate it.

Q. And how is the plug put in place?

A. There's a fixture, cylindrical fixture, with a pipe coming out the side that the hose is connected to. There is a plunger that is threaded

at one end to fit the threads in the center of the plug, and that -- that plunger has a T handle at the top. And before the fixture is attached to the unit, the plunger is threaded into the plug, and the plug is retracted back up into the fixture, and the fixture is placed on the evacuation port on the

(continued page 00076)

freezer.

Once the -- once the evacuation is complete, that plunger is used to push the plug down into the body of the evacuation port, and it's threaded back out of the plug and the fixture removed from the unit.

Q. How do you know the evacuation is complete?

A. The pressure of the complete manifold is monitored throughout the evacuation process. And when the vacuum pressure in the manifold drops below a value prescribed in the work instruction, then it is assumed that all of the units connected to the manifold have been evacuated below that vacuum pressure as well, and they are then sealed off, and they go to the warm vacuum check station to confirm the vacuum level in the individual unit.

Page 00077

Q. And when is the getter placed inside the unit in relation to drawing the vacuum?

A. It is installed during the assembly process. The sieve is attached, you know -- is either in that depression, in the case of the 808, or in other freezers. It's -- there's a pan for

that. But that is part of the inner vessel assembly. It is attached, and the sieve is put in place before the multi-layer insulation wrap is applied.

Plaintiffs Objections 602 speculation:

So I don't know how to place that relative to the evacuation, but that's probably about halfway through the assembly process prior to evacuation.

Page 00078

Q. The depression that the sieve material sits in, is that depression in the inner vessel or the outer vessel?

A. It is the inner vessel. The sieve needs to get cold to absorb as much material as it can. The

(continued page 00079)

0079

sieve would be ineffective attached to the outer.

Q. The sieve is not in the inner vessel in the sense of being exposed to liquid nitrogen when the tank is in use, correct?

A. Correct, it is not in the inner vessel. It is on the vacuum side of the inner vessel.

Q. And is the stainless steel sheet that you referred to tacked to the bottom of the inner vessel?

A. Yes.

Page 00094

Q. What is an annular line?

A. Well, it is line that passes through the vacuum space, generally speaking. It is called an annular line because the vacuum space is technically

referred to as the anulus.

Q. What is the purpose of those two annular lines?

(continued page 00095)

0095

A. One is to allow a pressure reading to measure the level of liquid nitrogen in the freezer. The other is used for introducing more liquid nitrogen into the freezer for filling.

Q. So one is a fill line and the other one is a level reading line?

A. Level sensor line.

Q. Level sensor line. How does the level sensor line function?

MR. SMITH: Asked and answered.

A. The weight of the liquid nitrogen above the port in the freezer has a pressure associated with it that is greater than ambient pressure, differential pressure. That -- the top end of that tube is connected through the plumbing to the differential pressure sensor inside the controller, and it monitors that pressure and calculates the liquid level in the freezer based on that pressure, and displays it, and also uses it to determine when it needs to fill -- initiate a fill and to end a fill.

Q. Did you say that the level it calculates is displayed on the controller?

A. Yes.

Q. Does the level calculated always match the

(continued page 00096)

0096

actual liquid nitrogen level in the tank?

MR. SMITH: Incomplete hypothetical.

A. Well, it is difficult to physically measure the level that's actually in the freezer. So, you know, we provide a level measurement stick to be used to take a manual measurement. Everyone reads that measurement differently because it causes the liquid to boil when you put the stick in it, which causes the frost line to be above the actual liquid level in the freezer. And everyone that I have ever seen use that method to measure interprets that level differently. Some add, some subtract to the frost line.

So it can be made to agree exactly with an individual's measurement with the measuring stick. But the next person that throws the measuring stick in there might read that stick differently and decide that what's on the display doesn't agree with it.

Page 00103

Q. When the tank is filled through the annular fill line, does that line expand or contract as the liquid nitrogen goes through it?

A. When it's cooled, it will contract.

Q. Is that to say that when liquid nitrogen

(continued page 00104)

0104

first starts to go through the fill line, the line would contract?

A. As it is cooled, it will contract. It will

not initially come down to liquid nitrogen temperature when you first start flowing liquid nitrogen through it. There's a time delay before the material actually begins to cool down. But once it does begin to cool down, it will contract.

BY MS. ZEMAN:

Q. Prior to a fill, would the annular fill line be at ambient temperature?

A. On the initial fill it would. On subsequent fills, the top end where it enters the head would be near ambient temperature. The bottom end of the tube where it enters the inner vessel would be near liquid nitrogen temperature.

Q. And in either instance, as you started to fill, it would begin to cool as liquid nitrogen runs through the tube?

MR. SMITH: Vague. Asked and answered.

A. It would.

BY MS. ZEMAN:

Q. And would that process where that annular line is contracting as it cools, would that put any stress on the weld line at the inner vessel?

(continued page 00105)

0105

MR. SMITH: Outside the scope. Calls for expert opinion. Incomplete hypothetical.

A. From my perspective, yes, it would introduce stress, but the material is capable of handling an amount of stress. I don't know the value off the top of my head. But that stress would not come anywhere near enough stress to deform the

material.

Q. Has any testing been done to evaluate the stress put on the weld?

A. No.

Q. By Chart or by MVE?

A. Not to my knowledge.

Q. Do you know why no testing has been done?

A. It was not believed that it was necessary.

Q. At what angle does the fill line enter the inner vessel?

A. The fill line itself is vertical. It makes a 90-degree turn in the elbow. And the elbow, you know, the liquid enters horizontally into the inner vessel.

Q. And does the sensor line connect with the 90-degree elbow?

A. Yes.

Q. Is it the same elbow construction?

(continued page 00106)

0106

A. It is the same part number. It is the same elbow.

Page 00107

Q. Well, what would you -- where does Chart manufacture stainless steel freezers?

(continued page 00108)

0108

A. Ball Ground, Georgia.

Page 00108

Q. Is the MVE 808 manufactured in Ball Ground?

A. It is.

13: Q. How long has it been manufactured there?
14: A. Sometime in the mid-'90s. Previously, MVE

Page 00110

07: Q. What is the expected service life for the
08: MVE 808?
09: A. I believe it's ten years.
10: Q. Do you know how that was determined?
11: A. I do not.
12: Q. Do you know what tests or other analysis
13: was done to identify ten years?
14: A. I do not.
15: Q. What does expected service life mean?
16: A. It means that it would -- it should perform
17: similar to new for that period of time.

Page 00113

22: Q. Does failure mode effects -- and effects
23: analysis sound familiar?
24: A. Yeah, that's it.
25: Q. That's what FMEA analysis is?

(continued page 00114)

0114
01: A. Yeah.
02: Q. And is that the same thing as risk
03: analysis?
04: MR. SMITH: Vague.
05: A. It is similar. The analysis that we did
06: for regulatory compliance was a risk analysis and --
07: but the label on it is the FMEA.
08: (Plaintiffs' Exhibit 159 marked.)
09: BY MS. ZEMAN:
10: Q. And I am going to hand you a document

that's been marked as Exhibit 159. If you could take a look at that.

A. Okay.

Q. Mr. Brooks, do you recognize what this document is?

A. I do.

Q. What is this?

A. It is the DFMECA analysis for Chart's cryogenic freezers.

Q. And what is DFMECA analysis?

A. Design failure mode -- I can't remember what all of the letters stand for. Maybe it's in here somewhere.

Q. Is it failure modes and effects criticality analysis?

(continued page 00115)

0115

A. Yeah, that sounds right.

Q. And what is this used for at Chart?

A. It is required for compliance to the European Medical Device Directive, and the intent is to look at all of the characteristics and features of a product and make some assumptions about what types of malfunctions could occur, and grade them for frequency of occurrence, severity of occurrence, and the risk involved.

Page 00128

Q. Does any failure mode in this dewar section involve the release of absorbed molecules from the molecular sieve?

(continued page 00129)

0129

A. Well, whenever -- whenever the inner vessel warms up, molecules will be released from the sieve. So if -- if, as a result of any of those modes, the inner vessel were to warm up, then it would release molecules from the sieve.

Q. Is that identified, though, in this DFMECA document?

A. I would have to read through it to determine that. DEW-12, dewar sieve.

Q. That failure mode refers to the sieve becoming saturated, correct?

A. Correct.

Q. Where does it refer to the sieve releasing molecules?

A. It doesn't specifically, but once it is saturated, and there's a vacuum failure, then it would warm up and potentially release molecules from the sieve.

Q. Why do you say "potentially"?

A. Well, I mean, all of this is really the group speculating what could happen. And, yeah, if the sieve is indeed saturated, holding all of the molecules that it can hold, then any warmup of the sieve would release -- it doesn't say it specifically there, but that's the only line item

(continued page 00130)

0130

that I saw that referred to the sieve.

Page 00137

Q. What would you need to know to determine how quickly 14 inches of liquid nitrogen would burn off of an MVE 808?

MR. SMITH: Outside the scope. Calls for speculation. Incomplete hypothetical.

A. If I knew the actual evaporation rate test result and the -- and I knew that the freezer was left undisturbed, an estimate -- an estimation could be made using that consumption rate, evaporation rate, and the estimate of the actual level in the freezer. All of our tests are done static with nobody disturbing the freezer in any way and with -- with nothing stored in the freezer.

So, you know, to be as accurate as possible would have to have an evaporation test done with some -- you know, whatever they're storing -- stored in the freezer so that the impact of that on the consumption rate would be known.

So, you know, the original test value from the production test would not apply to a freezer that has something stored in it because that inventory and the inventory system it's stored in has an impact on the consumption rate.

Page 00138

Q. Does Chart recommend that end users monitor liquid nitrogen usage?

A. They do recommend that they monitor the usage that is calculated and displayed by the controller.

Page 00139

Q. What are the signs of vacuum failure on a

cryogenic tank?

MR. SMITH: Overbroad. Outside the scope.

A. Increased consumption can be an indicator of vacuum degradation. Condensation or frost on the outside surface of a freezer where it normally would not occur can be an indication of vacuum

(continued page 00140)

0140

degradation. Those are the main things that come to mind.

Q. So increased consumption of liquid nitrogen, condensation and frost?

A. Yes.

Q. Why would frost occur?

A. When the insulation system degrades, then heat transfer allows the outside surface to be cooled by the liquid that is inside, and that can become cool enough to cause frost to accumulate if there is moisture in the air.

Page 00203

Q. At the bottom of this email from Ramon -- it's on the next page --

A. Uh-huh.

Q. -- last paragraph says, "We should plan to take action immediately as we have just experienced another 10 or so controllers that failed because the SN is showing '0.'"

Do you see that?

A. I see that.

Q. Okay. Chart did not take action immediately, correct?

25: MR. SMITH: Asked and answered.

(continued page 00204)

0204

01: A. They -- they did not take action on the
02: hardware implementation.
03: BY MR. WOLF:
04: Q. So this was written in February of 2016.
05: A. Okay.
06: Q. Did Chart take action immediately with
07: regard to this issue in any way?
08: MR. SMITH: Vague.
09: A. There -- there may have been -- you know,
10: the electronics guys may have looked into
11: alternative methods, but I can't say what they might
12: have considered his response to this. I don't know.
13: BY MR. WOLF:
14: Q. Okay. As you sit here today speaking for
15: Chart, can you list for me any actions that Chart
16: took immediately with regard to this issue from
17: February 29th, 2016?
18: A. I couldn't tell you.
19: Q. Okay. Two paragraphs up from that, Ramon
20: writes, "We should modify the technical manual to
21: update the customer to be sure to use shielded
22: network cables."
23: Chart did not do that, correct?
24: A. I cannot answer that. I do not know.
25: Q. Okay. Let me ask the question differently.

(continued page 00205)

0205

01: You have no knowledge that Chart did that, correct?

A. That is correct.
Q. Okay. And not just about updating the manual. You have no information that Chart told its customers, in any way, to be sure to use shielded network cables for their TEC300s, correct?
A. That's correct.
MR. SMITH: Calls for speculation.
BY MR. WOLF:
Q. He then writes, "We also need to modify our existing OFAF Master cable and Daisy Chain Kits to be sure they use shielded cables."
Do you see that?
A. I see that.
Q. Okay. You have no knowledge that Chart did that, too, right?
A. Correct.
Q. What's an OFAF?
A. One Fill All Fill.
Q. Okay. What is an OFAF Master cable?
A. That is the cable that can connects between two controllers to enable the One Fill All Fill system to function.
Q. And what's a Daisy Chain Kit?
A. That is a cable, and basically it's an RJ45

(continued page 00206)

0206

network-type cable and a jack splitter, a jack T, that allows more than one table to be connected to a single RJ45 modular jack.

Page 00266

Defense Objections 602 - Speculation:

Q. Okay. You said you have seen people manually measure liquid nitrogen in a freezer, right?
A. Yes.
Q. Okay. And I think what you said is that some people add or subtract to the ruler's frost line to get what they believe is the accurate liquid nitrogen measurements, right?
A. Yes.
Q. Okay. What's the range of how much people

(continued page 00267)

add to and subtract from the ruler's frost line?
MR. SMITH: Calls for wild speculation and incomplete hypothetical.
MR. WOLF: You know, it actually doesn't because he's seen it.
MR. SMITH: You said all people.
A. I don't know what the range is. You know, I've seen people add an inch, add a half inch, subcontract an inch, subtract a half inch.
BY MR. WOLF:
Q. Okay. In that range.
A. Sure.